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BRIEF REPORT

Aggressive and Unsafe Driving in Male Veterans Receiving Residential Treatment for PTSD

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Aggressive and unsafe driving was examined in 474 male veterans receiving Veterans Affairs residential treatment for posttraumatic stress disorder (PTSD). Specifically, the authors evaluated if PTSD was associated with aggressive and unsafe driving and if Iraq and Afghanistan War veterans were at higher risk than other war veterans. Approximately two thirds of the sample reported lifetime aggressive driving and one third reported current aggressive driving. Posttraumatic stress disorder severity was associated with aggressive driving, but not other forms of unsafe driving. Iraq and Afghanistan veterans endorsed higher rates of and more frequent aggressive driving than did other veterans. After accounting for PTSD severity, age, income, and marital status being an Iraq and Afghanistan War veteran predicted aggressive driving frequency and infrequent seatbelt use.

Vietnam War and Persian Gulf War veterans were more likely to die in motor vehicles accidents (MVAs) than were nondeployed veterans (Centers for Disease Control, 1987; Kang, Bullman, Macfarlane, & Gray, 2002). It has been speculated that warzone exposure might influence MVA deaths through heightened risk-taking behavior, intoxicated driving, seatbelt nonuse, and other risky behaviors (Bell, Amoroso, Wegman, & Senier, 2001).

Posttraumatic stress disorder (PTSD) could elevate risk for unsafe driving. Higher accident death rates, which include MVAs, have been found in Vietnam veterans with PTSD (Drescher et al., 2003). PTSD-related aggression and impulsivity could increase risk for aggressive driving, which contributes to over half of all MVA fatalities (AAA Foundation for Traffic Safety, 2009), and increases risk for injury (Wells-Parker et al., 2002), and other negative consequences (Galovski, Malta, & Blanchard, 2006). Co-occurring substance misuse might elevate risk for intoxicated driving and MVAs.

Risky driving may be particularly problematic among Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans. These veterans are typically younger than other veterans, and youth is a well-established risk factor for aggressive driving (Wells-Parker et al., 2002). Yet even after controlling for age, dangerous driving behaviors (speeding and seatbelt nonuse) were more common among United Kingdom (UK) military personnel deployed to Iraq than their nondeployed counterparts (Fear et al., 2008). Because troops in OEF/OIF are often attacked while driving, they adopt offensive (e.g., speeding, not stopping) and defensive (e.g., keeping great distance from other vehicles) driving behaviors to reduce vulnerability to roadside bombs and ambushes. Despite regulations, many deployed service members do not wear seatbelts, believing that they impede exit during emergencies or inhibit weapon use (Okpala, Ward, & Bhullar, 2007). These overlearned risky driving behaviors may be resistant to discontinuation when returning to driving at home.

Here we examine aggressive and unsafe driving in male veterans receiving residential PTSD treatment. Specifically, we examined if PTSD severity is associated with risky driving, and if so, what PTSD symptom clusters are important in this relationship. We also investigated whether OEF/OIF veterans evidence more aggressive and unsafe driving compared with other war veterans.

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Table 1. Means (Standard Deviations) and Percentages for Demographic Variables Among War Groups

	Total sample ($N = 474$)	OEF/OIF ($n = 46$)	PGW ($n = 42$)	VNW ($n = 386$)	Test statistic
Age in years *M* (*SD*)	51.8 (9.6)	30.5[a] (8.8)	38.6[b] (7.3)	55.8[c] (3.0)	$F(2, 472) = 885.42^{***}$
PCL-M *M* (*SD*)		64.9(10.5)	67.0(9.3)	63.3(11.3)	$F(2, 467) = 2.36$
BDI *M* (*SD*)		25.0(9.0)	26.8(7.4)	24.4(9.2)	$F(2, 469) = 1.34$
Race/ethnicity (%)					
Caucasian (vs. other)	59.1	60.0	59.5	59.0	$\chi^2(2, N = 472) = .02$
Hispanic American/Latino	17.2	24.4	7.1	17.4	
African American/Black	15.3	4.4	16.7	16.4	
Asian/Pacific Islander	2.8	4.4	9.5	1.8	
Other	4.7	7.3	7.3	5.4	
Education in years *M* (*SD*)	12.8 (2.5)	12.9 (1.5)	13.4 (1.8)	12.7 (2.8)	$F(2, 215) = .72$
Marital status (% married)	40.9	44.2	26.9	42.4	$\chi^2(2, N = 469) = 4.62$
Annual income (range in thousand $)	20–30	20–30[a]	10–20[b]	20–30[a]	$F(2, 392) = 8.59^{***}$
Any service connected VA disability (%)	51.5	6.5[a]	38.1[b]	58.3[c]	$\chi^2(2, N = 474) = 47.40^{***}$

Note. OEF/OIF = Operation Enduring Freedom/Operation Iraqi Freedom; PGW = Persian Gulf War; VNW = Vietnam War; PCL-M = PTSD Checklist-Military; BDI = Beck Depression Inventory; VA = Veterans Affairs. Values with matching superscript letters are not statistically significantly different at $p < .05$ using χ^2 analyses for frequency comparisons and Tukey's Honestly Significant Difference for mean comparisons.
$^{***}p < .01$.

METHOD

Participants

Participants were 474 male veterans attending a Department of Veterans Affairs (VA) PTSD residential, 60-day treatment program between October 2002 and January 2007. Table 1 provides sample demographic characteristics.

Measures

Risky driving was assessed with six items originally designed to clinically assess harm risk in VA PTSD patients (Ruzek et al., 2000). The items are (1) Have you engaged in verbal outbursts or made angry hand gestures while driving? (2) Have you tailgated, intentionally cutoff, or chased other drivers? (3) Have you driven after drinking or taking psychoactive drugs? (4) Have you intentionally driven your vehicle into another object (e.g., another car, tree, etc.)? (5) In the past 4 months, how frequently have you driven in an aggressive manner? (6) In the past 4 months, how regularly did you use seatbelts as a driver or passenger in a car (or other motor vehicle)? For items 1–4, response options were "Yes, in the past 4 months prior to entering this treatment program (or an immediately prior treatment program)"; "Yes, but over 4 months ago"; and "No, I have never done so." Items 5 and 6 used a 7-point scale (1 = *rarely*, 4 = *sometimes*, and 7 = *very regularly*). For items 1–4, lifetime endorsement was met if either or both yes responses were endorsed. Participants were categorized as current aggressive drivers if they endorsed items 1, 2, or 4 in the past 4 months. Seatbelt frequency was dichotomized at sometimes or more to reflect the noncontinuous, bimodal nature of this variable.

We measured both PTSD and depressive symptoms. The PTSD Checklist-Military Version (PCL-M; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report measure of PTSD symptoms from stressful military experiences according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994). The Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988) is a 21-item questionnaire of depressive symptoms with well-established psychometric properties.

RESULTS

Current, that is within the past 4 months, (and lifetime) rates of aggressive driving were as follows: 35.9% (76.4%) reported engaging in verbal outbursts or making angry hand gestures; 20.0% (52.6%) reported having tailgated, intentionally cutoff, or chased other drivers; and 0.6% (11.7%) reported having intentionally driven their vehicle into another object. Over a quarter of the sample (28.5%) reported sometimes or more driving aggressively in the past 4 months. The current rate of driving after drinking or using substances was 12.8% (lifetime: 62.8%) and 9.2% reported using seatbelts less than sometimes.

Aggressive drivers ($n = 174$, 37%) compared with those who denied aggressive driving, $n = 292$, 61% (2% had missing data), had elevated BDI scores, $d = 0.33$, $t(458) = 3.37$, $p < .01$, PCL scores, $d = 0.34$, $t(457) = 3.47$, $p < .01$, PCL avoidance

symptoms, $d = 0.36$, $t(459) = 3.71$, $p < .01$, and PCL arousal symptoms, $d = 0.37$, $t(458) = 3.77$, $p < .01$, but not PCL intrusion symptoms, $d = 0.12$, $t(459) = 1.24$, *ns*.

War cohorts differed in rates of verbal outbursts/angry hand gestures, χ^2 (2, $N = 471$) = 17.50, $p < .001$, tailgating/cutting-off/chasing other drivers, χ^2 (2, $N = 470$) = 16.57, $p < .001$, driving after drinking or using substances, χ^2 (2, $N = 468$) = 7.10, $p < .05$, and seatbelt use, χ^2 (2, $N = 469$) = 7.22, $p < .05$. OEF/OIF veterans were more likely than Vietnam veterans to report verbal outbursts/angry hand gestures (63% vs. 31%), tailgating/cutting off/chasing drivers (41% vs. 16%), driving after drinking or substance use (24% vs. 11%), and wearing seatbelts less than sometimes (20% vs. 8%). OEF/OIF veterans also reported more verbal outbursts/angry hand gestures than did Persian Gulf veterans (63% vs. 41%). No significant differences were found between Persian Gulf and Vietnam veterans on these behaviors.

Logistic and multiple regression analyses assessed the extent to which elevated risky driving among OEF/OIF veterans was independent of covariates. Model 1 included PTSD severity, age, income, and marital status as predictors (see Table 2). Income and marital status were included because they varied by cohort and were positively associated with one or more risky driving behaviors (perhaps because patients who were married and had higher incomes had better access to a car and drove more). Service-connected status was not included because it did not predict any driving behaviors. Model 2 included these predictors plus war cohort, coded with two contrasts: OEF/OIF compared with Persian Gulf and Vietnam, and Persian Gulf compared with Vietnam. Inclusion of income significantly reduced sample sizes because of missing responses (maybe reflecting the sensitive nature of this question).

Endorsement of any recent aggressive driving was associated with greater PTSD severity, younger age, higher income and being married. War cohort did not incrementally improve prediction of this outcome.

Aggressive driving frequency was associated with greater PTSD severity, younger age, higher income, and being married. After controlling for these factors, war cohort added unique variance, incremental $R^2 = .015$, with OEF/OIF veterans reporting more frequent aggressive driving than other veterans.

The probability of driving after drinking or using substances was predicted only by younger age and higher income; war cohort did not improve prediction. Posttraumatic stress disorder symptoms, age, income, and marital status did not predict infrequent seatbelt use. After controlling for these factors, war cohort added to the prediction of this outcome, with OEF/OIF veterans being much more likely than other veterans to infrequently use seat belts.

DISCUSSION

These findings suggest that risky driving is common in male war veterans attending VA residential treatment for PTSD. Lifetime rates of specific aggressive driving behaviors found here are roughly

Table 2. Predictors of Unsafe Driving Behaviors

	Aggressive driving frequency	Any aggressive driving		Driving after substance use		Infrequent seatbelt use	
	β	OR	CI	OR	CI	OR	CI
Model 1	F (4, 368) = 18.19***	χ^2(4, $N = 373$) = 54.76***		χ^2(4, $N = 380$) = 21.76***		χ^2(4, $N = 380$) = 5.88	
PCL-M	.10*	1.02**	1.00–1.05	1.03*	0.98–1.06	1.02	0.98–1.05
Age	−.29***	0.94***	0.93–0.97	0.95***	0.92–0.98	0.98	0.94–1.01
Income	.20***	1.20***	1.04–1.38	1.26**	1.04–1.53	0.85	0.66–1.09
Married	.15***	2.52***	1.53–4.16	0.70	0.35–1.41	0.86	0.36–2.02
Model 2	F (6, 366) = 13.40***	χ^2(5, $N = 373$) = 54.83***		χ^2(6, $N = 378$) = 26.40***		χ^2(6, $N = 380$) = 12.99**	
PCL-M	.10*	1.02**	1.01–1.05	1.03	0.99–1.06	1.02	0.99–1.06
Age	−.12	0.95*	0.90–1.00	0.88***	0.80–0.95	1.04	0.96–1.12
Income	.17**	1.20**	1.04–1.38	1.33***	1.08–1.64	0.77*	0.59–1.01
Married	.15**	2.54***	1.54–4.19	0.66	0.33–1.34	0.84	0.35–2.01
OEF/OIF vs. PGW–VNW	.19*	1.03	0.37–3.27	0.18*	0.03–1.06	8.81**	1.66–46.74
PGW vs. VNW	.03	1.16	0.37–3.66	0.19*	.03–1.30	0.98	0.14–6.72
Test statistic (change)	F (2, 366) = 3.37*	χ^2(2, $N = 373$) = 0.07		χ^2(2, $N = 378$) = 4.64		χ^2(2, $N = 380$) = 7.11**	

Note. OR = odds ratio; CI = 95% confidence interval; OEF/OIF = Operation Enduring Freedom/Operation Iraqi Freedom; PGW = Persian Gulf War; VNW = Vietnam War; Any aggressive driving = engaged in verbal outbursts or made angry hand gestures while driving, and/or tailgated, intentionally cutoff, or chased other drivers, and/or intentionally driven vehicle into another object; Substance use = after drinking or taking psychoactive drugs; PCL-M = PTSD Checklist-Military.
* $p < .10$. ** $p < .05$. *** $p < .01$.

2 to 10 times higher than in the general U.S. population (Wells-Parker et al., 2002). They also suggest a link between PTSD severity and aggressive driving, with avoidance and arousal symptom clusters apparently being most important in this relationship. This comports with the previously mentioned study of UK soldiers returned from Iraq with PTSD having increased rates of risky driving (Fear et al., 2008).

It was also found that OEF/OIF veteran status predicted aggressive driving frequency but not likelihood of being an aggressive driver, after accounting for covariates, which may reflect the greater sensitivity of the frequency measure compared to the dichotomous aggressive driver variable. Infrequent seatbelt use was also more likely for OEF/OIF veterans than for the other cohorts, after accounting for covariates. No cohort differences emerged for driving after drinking or using substances.

These findings have limitations. First, only self-report measures were used with single-item measures of driving acts. Future research should utilize more comprehensive driving measures, assessment methods (e.g., interviews, actual driving or simulations), and collateral information (e.g., driving records). Second, these findings rely on retrospective reports of risky driving, making a causal link with PTSD or war cohort impossible to establish. It could be that the most aggressive, risky personality types (e.g., sensation seekers; Schwebel, Severson, Ball, & Rizzo, 2006) select military roles that increase trauma risk and PTSD, and aggressive driving. Likewise, current PTSD severity could inflate reporting of aggressive driving. Prospective research could overcome these shortcomings. Third, the potential effects of comorbid mental health conditions were not controlled. Finally, all participants were male in one PTSD treatment setting. Research is needed with other veteran groups, including female veterans, as gender differences in aggressive driving are well documented (e.g., Wells-Parker et al., 2002).

REFERENCES

AAA Foundation for Traffic Safety. (2009) Aggressive driving: Research update. Washington, DC: AAA Foundation for Traffic Safety. Retrieved January 20, 2009 from http://www.aaafoundation.org/pdf/AggressiveDrivingResearchUpdate2009.pdf

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, DC: Author.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clinical Psychology Review, 8, 77–100.

Bell, N. S., Amoroso, P. J., Wegman, D. H., & Senier, L. (2001). Proposed explanations for excess injury among veterans of the Persian Gulf War and a call for greater attention from policymakers and researchers. Injury Prevention, 7, 4–9.

Centers for Disease Control. (1987). The Centers for Disease Control Vietnam Experience Study. Post service mortality among Vietnam veterans. Journal of the American Medical Association, 257, 790–795.

Drescher, K. D., Rosen, C. S., Burling, T. A., & Foy, D. W. (2003). Causes of death among male veterans who received residential treatment for PTSD. Journal of Traumatic Stress, 16, 535–543.

Fear, N. T., Iversen, A. C., Chatterjee, A., Jones, M., Greenberg, N., Hull, L., et al. (2008). Risky driving among regular armed forces personnel from the United Kingdom. American Journal of Preventive Medicine, 35, 230–236.

Galovski, T. E., Malta, L. S., & Blanchard, E. B. (2005). Road rage: Assessment and treatment of the angry aggressive driver. Washington, DC: American Psychological Association.

Kang, H. K., Bullman, T. A., Macfarlane, G. J., & Gray, G. C. (2002). Mortality among US and UK veterans of the Persian Gulf War: A review. Occupational and Environmental Medicine, 59, 794–799.

Okpala, N. C., Ward, N. J., & Bhullar, A. (2007). Seatbelt use among military personnel during operational deployment. Military Medicine, 172, 1231–1233.

Ruzek, J., Sherker, J., Dorian, E., Zeller, M., Huss, M., Drescher, K., et al. (2000). The High-Risk Behaviors Questionnaire. Unpublished manuscript, VA National Center for PTSD.

Schwebel, D. C., Severson, J., Ball, K. K., & Rizzo, M. (2006). Individual difference factors in risky driving: The roles of anger/hostility, conscientiousness, and sensation-seeking. Accident Analysis and Prevention, 38, 801–810.

Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993, October). The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio.

Wells-Parker, E., Ceminsky, J., Hallberg, V., Snow, R. W., Dunaway, G., Guiling, S., et al. (2002). An exploratory study of the relationship between road rage and crash experience in a representative sample of US drivers. Accident Analysis and Prevention, 34, 271–278.